

Patent claims

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1. Process for the preparation of completely or partly saturated organic compounds by catalytic hydrogenation of unsaturated organic compounds with hydrogen or hydrogen-containing gas mixtures in the presence of a shaped Raney catalyst as the hydrogenation catalyst, characterized in that the Raney catalyst is in the form of hollow bodies.
 2. Process according to claim 1, characterized in that the Raney catalysts in the form of hollow bodies comprise nickel, cobalt, copper, iron, platinum, palladium, ruthenium or mixtures of these metals as catalytically active constituents.
 3. Process according to claim 1 or 2, characterized in that the Raney catalyst is in the form of hollow spheres.
 4. Process according to claim 1 or 3, characterized in that the bulk density of the Raney catalysts used is in the range from 0.3 g/ml to 1.3 g/ml.
 5. Process according to claim 1 or 4, characterized in that the catalyst shaped articles used have a diameter in the range from 0.05 to 20 mm.
 6. Process according to one or more of claims 1 to 4, characterized in that the catalyst shaped articles used have a shell thickness in the range from 0.05 to 7 mm, preferably 0.1 mm to 5 mm.
 7. Process according to one or more of claims 1 to 6, characterized in that the activated catalyst shaped articles used in the process comprise an inorganic binder.

8. Process according to one or more of claims 1 to 6, characterized in that the activated catalyst shaped articles used in the process comprise no binder.
9. Process according to one or more of claims 1 to 8, characterized in that the Raney catalyst in the form of hollow bodies used is doped with one or more elements from groups 3B to 7B, 8 and 1B of the periodic table, in particular chromium, manganese, iron, vanadium, tantalum, titanium, tungsten, molybdenum, rhenium and/or metals of the platinum group.
10. Process according to one or more of claims 1 to 9, characterized in that the Raney catalyst in the form of hollow bodies used is doped with one or more elements from groups 1A, 2A, 2B and/or 3A of the periodic table and/or germanium, tin, lead, antimony or bismuth.
11. Process according to one or more of claims 1 to 10, characterized in that the hydrogenation is carried out in a fixed bed or suspension reactor in continuous operation.
12. Process according to one or more of claims 1 to 10, characterized in that the hydrogenation is carried out in the batch process.
13. Process according to one or more of claims 1 to 12, characterized in that cyclohexanes with 0 to 6 substituents from the series consisting of alkyl, cycloalkyl, aryl, alkenyl, alkinyl F, Cl, Br, I, NO₂, NH₂, NHalkyl, NHaryl, Nalkyl₂, Naryl₂, OH, HS, alkylS, arylS, S=C, alkyl-CO-O, aryl-CO-O, alkyl-SO, aryl-SO, alkyl-SO₂, aryl-SO₂, alkyl-SO₃, aryl-SO₃, CN, O=Calkyl, O=Caryl, HOOC, H₂NO₂, alkylOOC, arylOOC, alkylO, Sialkyl₃, Sialkyl₂aryl, Sialkylaryl₂, cycloalkylO, arylO are obtained as products.

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14. Process according to one or more of claims 1 to 12, characterized in that saturated heterocyclic compounds with 0 to 6 substituents from the series consisting of alkyl, cycloalkyl, aryl, alkenyl, alkynyl F, Cl, Br, I, NO₂, NH₂, NHalkyl, NHaryl, Nalkyl₂, Naryl₂, OH, HS, alkylS, arylS, S=C, alkyl-CO-O, aryl-CO-O, alkyl-SO, aryl-SO, alkyl-SO₂, aryl-SO₂, alkyl-SO₃, aryl-SO₃, CN, O=Calkyl, O=Caryl, HOOC, H₂NOC, alkylooc, arylOOC, alkylo, Sialkyl₃, Sialkyl₂aryl, Sialkylaryl₂, cycloalkylo, arylO are obtained as products.
15. Process according to one or more of claims 1 to 12, characterized in that saturated organic compounds of the general formula H₃C-(CH₂)_n-X are obtained as products, wherein n is an integer between 1 and 30, preferably between 4 and 25, and X is a functional group from the series consisting of cycloalkyl, aryl, F, Cl, Br, I, NO₂, NH₂, NHalkyl, NHaryl, Nalkyl₂, Naryl₂, OH, HS, alkylS, arylS, S=C, alkyl-CO-O, aryl-CO-O, alkyl-SO, aryl-SO, alkyl-SO₂, aryl-SO₂, alkyl-SO₃, aryl-SO₃, CN, O=Calkyl, O=Caryl, HOOC, H₂NOC, alkylooc, arylOOC, alkylo, Sialkyl₃, Sialkyl₂aryl, Sialkylaryl₂, cycloalkylo, arylO.
16. Process according to one or more of claims 1 to 12, characterized in that mixtures of completely and/or partly saturated fats, fatty acids, fatty nitriles, fatty amines and/or fatty acid esters are obtained.
17. Process according to one or more of claims 1 to 12, characterized in that the products are butanediol or/and butenediol from the hydrogenation of butinediol.
18. Process according to one or more of claims 1 to 12, characterized in that the products are butanediol or/and butenediol from the hydrogenation of butinediol in the presence of the shell-activated tablets of the Raney type alloy.

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19. Process according to one or more of claims 1 to 12, characterized in that the products are butanediol or/and butenediol from the hydrogenation of butinediol in the presence of the shell-activated tablets of the Raney type alloy which is doped [sic] with one or more elements from groups 3B to 7B, 8 and 1B of the periodic table, in particular chromium, manganese, iron, vanadium, tantalum, titanium, tungsten, molybdenum, rhenium and/or metals of the platinum group.
20. Process according to one or more of claims 1 to 12, characterized in that the products are butanediol or/and butenediol from the hydrogenation of butinediol in the presence of the shell-activated tablets of the Raney type alloy which is doped with one or more elements from groups 1A, 2A, 2B and/or 3A of the periodic table and/or germanium, tin, lead, antimony or bismuth.
21. Process according to one or more of claims 1 to 12, characterized in that the products are saturated rings from the hydrogenation of aromatics.
22. Process according to one or more of claims 1 to 12, characterized in that the products are saturated rings from the hydrogenation of aromatics in the presence of the shell-activated tablets of the Raney type alloy.
23. Process according to one or more of claims 1 to 12, characterized in that the products are saturated rings from the hydrogenation of aromatics in the presence of the shell-activated tablets of the Raney type alloy which is doped with one or more elements from groups 3B to 7B, 8 and 1B of the periodic table, in particular chromium, manganese, iron, vanadium, tantalum, titanium, tungsten, molybdenum, rhenium and/or metals of the platinum group.

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24. Process according to one or more of claims 1 to 12, characterized in that the products are saturated rings from the hydrogenation of aromatics in the presence of the shell-activated tablets of the Raney type alloy which is doped with one or more elements from groups 1A, 2A, 2B and/or 3A of the periodic table and/or germanium, tin, lead, antimony or bismuth.
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